PATENT SPECIFICATION 944,639

P03ATS00EDE

DRAWINGS ATTACHED.

Inventor:—CHARLES ARTHUR GRIFFIN.

944,639

Date of filing Complete Specification : Nov. 8, 1962.

Application Date : March 6, 1962. No. 8525/62.

Complete Specification Published : Dec. 18, 1963.

Index at Acceptance :—Classes F2 A(43, 48); B1 D(1E, 1F, 2J1B2, 2J1C3).

International Classification :—F 06 n (B 01 d).

COMPLETE SPECIFICATION.

Engine Lubricating Systems.

We, MORRIS MOTORS LIMITED, of Cowley, Oxford, a British Company, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to lubricating systems of internal combustion engines, and especially those of motor vehicles.

In the case of motor vehicles, it has long been common practice to change the engine oil after the first few hundred (nominally 500) miles of operation have been completed, in order to flush out any free solid particles which may be present in the engine sump or elsewhere in the lubricating system. After this initial flushing-out operation, the engine oil is normally changed at such mileage-intervals (e.g. every 3,000 miles) as may be recommended by the vehicle manufacturer. Any such recommendation, however, is merely intended as a general guide, and does not imply that modern engine oils necessarily deteriorate appreciably after the specified period of use.

The principal factor that engenders clogging of the oil filter of an internal combustion engine is the progressive formation of sludge from the oil; and the rate at which sludge is formed varies greatly with the conditions under which the engine is operating. Thus, experience has shown that, in the case of motor vehicles which are wholly or mainly employed on fairly long cross-country journeys, severe clogging of the engine oil filter does not usually occur until completion of a mileage which exceeds very considerably the purely nominal one recommended as the oil-change interval; but in the case of vehicles which operate for the most part only on very short journeys, with the engine remaining inactive for long periods, the rate at which sludge is formed in the oil is so accelerated that the filter may well have become badly clogged at a mileage which is far less than the recommended oil-change interval.

On the basis of the considerations indicated above, we have evolved an improved lubricating system that represents a new departure in the servicing of internal combustion engines. Instead of specifying arbitrary oil-change intervals which cannot always be appropriate, we now propose to engineer matters so that, in effect, the prevailing general operating conditions of the individual engine govern the oil-change interval. This is achieved very effectively, and in comparatively simple manner, by means of the invention.

The invention comprises an improved lubricating system for internal combustion engines, incorporating an oil pump and a full-flow filter of the type having a replaceable filter element; in which: the need for changing the engine oil in normal service (i.e. subsequent to the initial flushing-out oil-change usually effected early in the service life of the engine) is made contingent solely upon the filter element having become unduly clogged and, therefore, needing replacing; and undue clogging of the filter element is indicated automatically by an electrical warning device the circuit of which includes a switch whose contacts are normally separated by spring-loading the movable contact but are closed by deflection of a flexible diaphragm, of oil-resistant and electrically-insulating material, which bears against the movable switch contact, and which, when the oil pump is operating, is

[*Price 4s. 6d.*]

subjected to the differential oil-pressure existing across the filter element, and becomes deflected when that differential pressure attains a preselected value resulting from the filter element having become unduly clogged.

The preferred embodiment of the invention, for application to a motor vehicle, will now be described with reference to the accompanying drawing which is a sectional elevation of an engine oil filter fitted with a pressure-responsive switch unit. This unit, indicated generally at 1, is mounted (with a gasket 2 interposed) on a facing 3 provided on the body of the engine oil filter 4. The latter is of the full-flow type, and has a replaceable filter element 5 of the resin-impregnated paper type.

The switch unit 1 comprises base and body portions 6 and 7 respectively, secured together by screws (not shown), with an intervening diaphragm 8 of nylon-reinforced nitrile rubber. The central zone of the diaphragm has a seating 9 on the inner side of the base 6 of the switch unit, and this seating surrounds a passage 10 that extends through the base. The passage 10 registers with a duct 11 in the body of the filter, this duct receiving oil direct from the pump by way of a delivery pipe 12. Filtered oil passes through another duct 13 in the body of the filter, then through a corresponding passage 14 in the base 6 of the switch unit and then through a hole 15 in the clamped zone of the diaphragm 8 to a space 16 at the side of the diaphragm remote from its seating. The space 16 is, of course, within the body portion 7 of the switch unit, and accommodates the contact assembly.

The diaphragms 8 is normally held against its seating 9 by the thrust of a helical compression spring 17 trapped between a bowl-shaped movable switch contact 18, abutting the diaphragm, and an insulating collar 19 on a metal spigot 20 which locates the spring 17. The spigot 20, which in conjunction with the spring affords electrical connection with the movable contact 18, is insulated both from the body of the switch unit and from the stationary contact 21, which is also bowl-shaped and surrounds the spigot.

The arrangement is such that, so long as the filter element remains unclogged, the diaphragm 8 is held on its seating 9 by the spring-loading. But when the filter element 5 is unduly clogged, and the oil pump is operating, the differential oil-pressure then existing across the filter element attains such a value (e.g. 9 p.s.i.) that the diaphragm 8 deflects, overcoming the spring-loading and causing the switch contacts 18 and 21 to complete, through a terminal 22, the circuit of a warning lamp on the instrument panel of the vehicle.

The filter has the usual by-pass provision, including a relief valve which is set to open at a pressure of from 12 to 16 p.s.i. It will be appreciated that this blow-off pressure must be higher than the differential oil-pressure necessary to deflect the switch diaphragm 8.

Various prior proposals have been made for affording automatic indication of the clogging of the engine oil filter in a motor vehicle, and in some cases provision has been suggested to prevent a false indication being given upon starting a cold engine, due to the abnormally high oil pressure then arising. We consider, however, that such elaboration is unnecessary because any false indication that might arise would only be transient, whereas a true indication (obtained with the engine running at its normal temperature) would be given persistently.

We employ the usual oil-pressure warning lamp as the indicator for the present purpose. The fact that this lamp operates upon switching on the ignition system of the engine affords fairly frequent confirmation that it is in working order for the other service. It is readily possible to ascertain whether a persistent indication given by this lamp signified loss of oil-pressure or clogging of the oil filter.

WHAT WE CLAIM IS:—

1. A lubricating system for internal combustion engines, incorporating an oil pump and a full-flow filter of the type having a replaceable filter element; in which: the need for changing the engine oil in normal service (i.e. subsequent to the initial flushing-out oil-change usually effected early in the service life of the engine) is made contingent solely upon the filter element having become unduly clogged and, therefore, needing replacing; and undue clogging of the filter element is indicated automatically by an electrical warning device the circuit of which includes a switch whose contacts are normally separated by spring-loading the movable contact but are closed by deflection of a flexible diaphragm, of oil-resistant and electrically-insulating material, which bears against the movable switch contact, and which, when the oil pump is operating, is subjected to the differential oil-pressure existing across the filter element, and becomes deflected when that differential pressure attains a preselected value resulting from the filter element having become unduly clogged.

2. The combination of a full-flow engine oil filter and a diaphragm-operated switch unit, arranged substantially as described with reference to the accompanying drawing.

A. H. STEED,
Chartered Patent Agent.

Abingdon: Printed for Her Majesty's Stationery Office, by Burgess & Son (Abingdon), Ltd.—1963.
Published at The Patent Office, 25, Southampton Buildings, London, W.C.2,
from which copies may be obtained.

944639 COMPLETE SPECIFICATION

1 SHEET *This drawing is a reproduction of the Original on a reduced scale*